Improving Real Estate Price Predictions through Visual Imagery/Deep Learning

Neal Cheng

Real Estate Predictions through Machine Learning

Real Estate - A Well-Studied Problem

ZEstimate

Trulia Estimate

Redfin Estimate

Traditional vs. Proposed Model
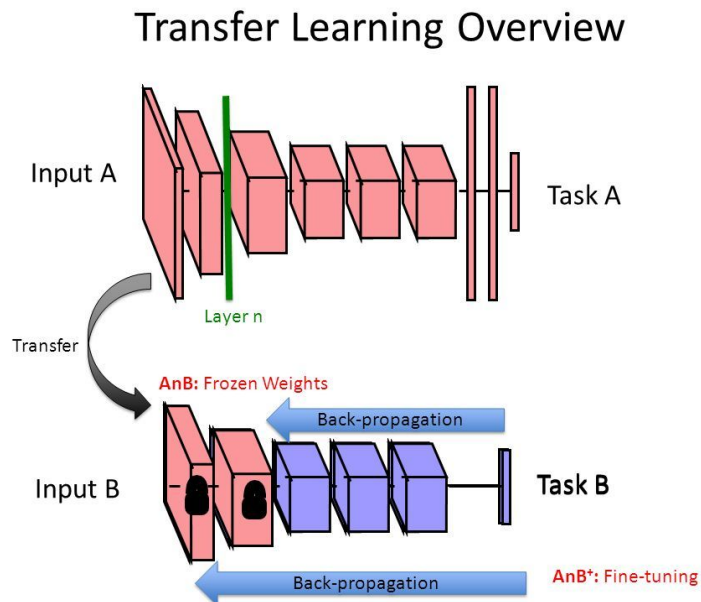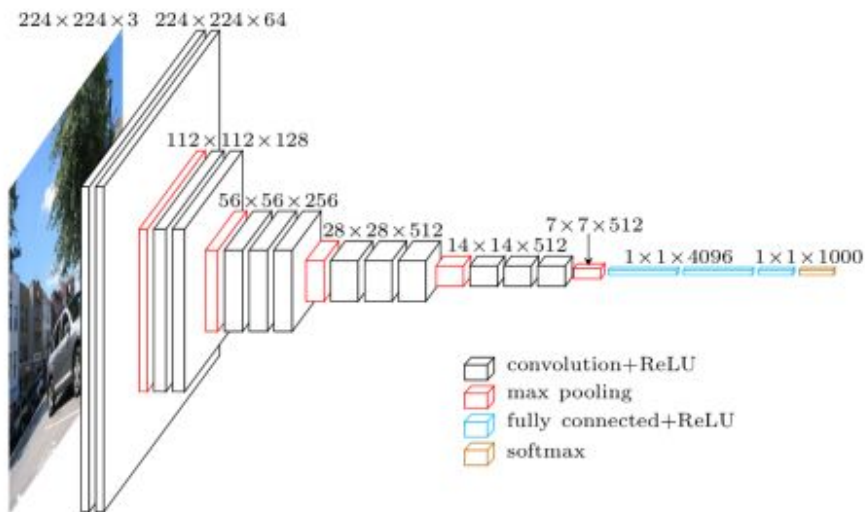
Traditional models:

- Location
- Sqft.
- Number of bed/bathrooms
- And others

Does Not Capture:

- "Niceness"
- Ambiance
- Aesthetics

Proposed Method: The incorporation of housing imagery

Model: Conv. Neural Network - VGG 16

$224 \times 224 \times 3$ $224 \times 224 \times 64$

$112 \times 112 \times 128$

$56 \times 56 \times 256$

$28 \times 28 \times 512$

$14 \times 14 \times 512$

$7 \times 7 \times 512$

$1 \times 1 \times 4096$ $1 \times 1 \times 1000$

convolution+ReLU
max pooling
fully connected+ReLU
softmax

Transfer Learning Overview

Input A

Task A

Layer n

Transfer

AnB: Frozen Weights

Back-propagation

Input B

Task B

AnB⁺: Fine-tuning

Back-propagation
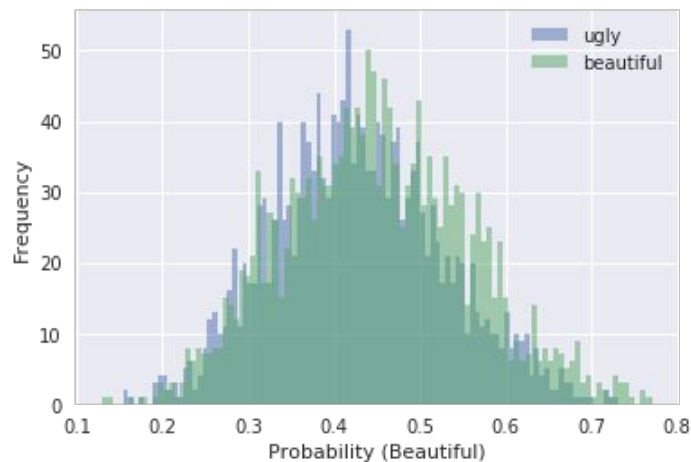
Customization of VGG-16: Learning Categories

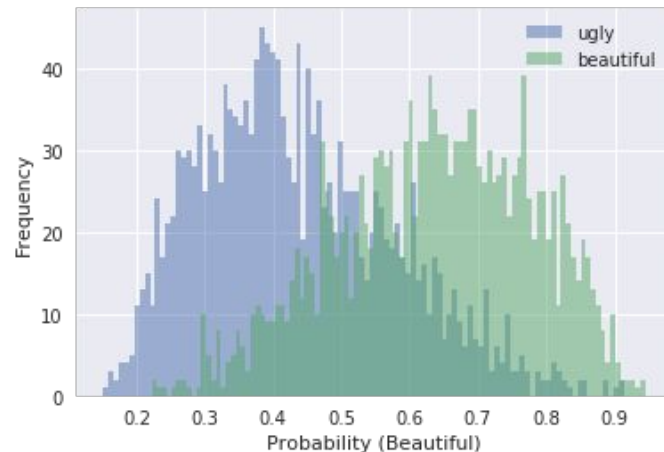# Customization of VGG-16: Learning Beauty

Results: Before and After Training
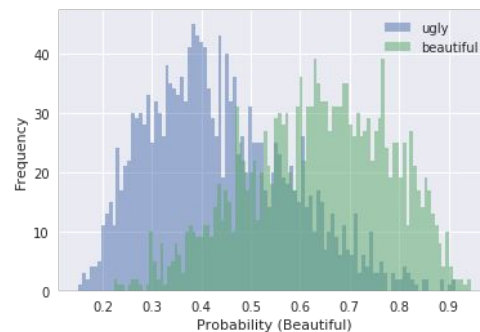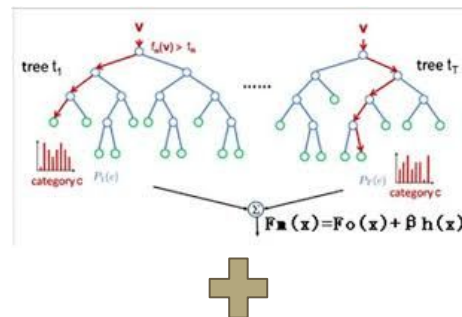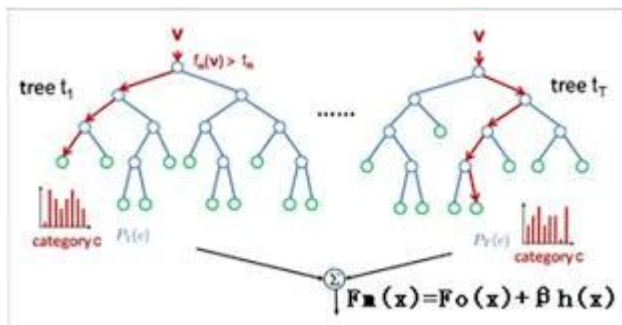
Untrained VGG-16

Customized VGG-16

Predicting Price

Gradient-Boosted Regressor R^2: 0.55

Gradient-Boosted Regressor
Augmented with Neural Network: R^2: 0.63

Thanks for watching!

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Or just reach me after the presentations!